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5-22-2006

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Recommended Citation

Robertson, Alison E., "Corn seedling health and stand establishment" (2006). *Integrated Crop Management News*. Paper 1265.
<http://lib.dr.iastate.edu/cropnews/1265>

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INTEGRATED CROP MANAGEMENT

Corn seedling health and stand establishment

With all of the corn planted and most of the soybean, now is the time to start evaluating plant stands. Corn germination and emergence were prolonged by cooler than normal temperatures that occurred during planting. Cool soil conditions (<50–55 °F) also predispose seedlings to infection by a number of fungi that cause seedling disease, and can result in seedling death. Therefore, as you start to assess plant stands, it is important to dig up seedlings every now and then to check general root health. Uneven emergence and stunted seedlings may indicate seedling disease but also can be due to insect feeding and herbicide damage.

Survival of young corn seedlings depends on a healthy kernel and mesocotyl, which should remain firm and white through at least growth stage V6 (see www.kingcorn.org/news/articles.04/Roots-0511.html). Damage to the kernel or mesocotyl prior to establishment of the nodal root system can result in stunted, weak, or dead seedlings. This is because a developing corn seedling relies on the kernel endosperm for nourishment until the nodal root system has fully developed, usually around the 6-leaf stage. Thus, the mesocotyl acts as the “pipeline” for translocation of nutrients from the kernel and seminal roots to the seedling stalk and leaf tissues. In the past week, I have received a couple of reports of mesocotyl rot and resultant seedling death. Since the corn is only at V2–V3, it is possible that what looks like a great stand now, may not look so great in a week or so.

Seedling diseases of corn (seed rots, seedling blights, and/or root rots) are caused by numerous fungi including *Pythium*, *Fusarium*, *Rhizoctonia*, *Aspergillus*, *Penicillium*, and *Trichoderma*, all of which are common inhabitants of soils. In addition, these fungi also can be seedborne in corn, except *Pythium*. Seedling susceptibility to infection increases the longer the seed sits in the ground, and the more stress germinating corn undergoes. Corn germinates well at soil temperatures above 68 °F. When soil temperatures are below 55 °F, germination is greatly retarded. Thus, seedling disease often is more severe in early planted or no-till/reduced tillage fields because of cool soil temperatures. Corn-on-corn fields also are more prone to seedling blight due to higher inoculum pressure.

Typical belowground symptoms associated with seedling disease include rotting seed and brown discoloration (rotting) of the mesocotyl and seminal roots (see figure). It is sometimes possible to determine in the lab which fungus is the culprit; however, this information is not crucial since management options are the same for all seedling disease: plant high quality fungicide-treated seed, plant when soil temperatures are >50 °F, and ensure planting depth is not too deep. Although crop rotation can be helpful in reducing inoculum levels, some fungi are pathogenic on both corn and soybean. Thus, good records of seedling disease problems

can be helpful from a management point of view. For example, fields with a history of seedling blight can be planted later in a planting schedule when soil temperatures are warmer.

Corn seed treatment fungicides have been standard practice in corn production since the 1930s, and one only needs to plant untreated seed once to realize the benefit they provide. Most seed this year has been treated with Maxim XL®, which contains mefenoxam (effective against *Pythium*) and fludioxonil (a broad spectrum fungicide), and Apron® (metalaxyl) for extra protection against *Pythium*. In addition to these two fungicides, some seed companies have included a third compound, Dynasty®, which contains azoxystrobin, a strobilurin. In the last couple of years, strobilurins, namely azoxystrobin and trifloxystrobin (found in Trilex®), have started to be used as seed treatments. Strobilurins are broad spectrum fungicides that have some systemic properties. All seed treatments have a limited period of activity, usually 2–3 weeks.



[1]

Cold soil temperatures predispose corn seedlings to infection by soilborne fungi, which can result in rotted mesocotyl tissue (left), seed rot, and root rot. A healthy mesocotyl is shown on the right.

This article originally appeared on page 131 of the IC-496(12) -- May 22, 2006 issue.

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